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HOT-WATER TREATMENT OF SUGAR CANE FOR INSECT PESTS.—A PRECAUTION.

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The hot-water treatment of sugar cane for the destruction of insect pests, suggested by E. W. Brandes, of the Office of Sugar-Plant Investigations, Bureau of Plant Industry, has much of promise for reducing or eliminating infestation, especially with reference to the moth borer (*Diatraea saccharalis crambidoides* Grote) and the sugar-cane mealybug (*Pseudococcus calceolariae* Mask), which are the principal insect pests of sugar cane in the Southern States. Recent tests as here reported indicate, however, that there is danger of injuring the cane by this treatment if it has sprouted during winter storage. Even should this treatment be impracticable for general application with sprouted cane, it may still serve a useful purpose in the preparation of such cane for transportation to an uninfested locality or for the planting of special areas for seed-cane production.

Since the original experiments were made on a small scale by Doctor Brandes in January, 1922, the tests were carried out at his suggestion on a larger scale at Audubon Park, New Orleans, La., by T. E. Holloway and his assistants, W. E. Haley and J. W. Ingram, of the Bureau of Entomology. The results of these tests were briefly reported in January, 1923.[1] The results of the original experiments by Doctor Brandes, in which it was determined that heating individual infested cane stalks for 20 to 30 minutes in water at 52° C. sufficed to kill the moth borer and its larvæ, were never published but were communicated by Doctor Brandes in private conversation to Mr. Holloway in July, 1922, with the suggestion that the entomologists carry the experiments further and on a more extensive scale.

[1] T. E. Holloway. Sugar cane insects in 1922. *In* Louisiana Planter, vol. 70, no. 4, p. 70. 1923.

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Prior to his experiments on destroying the moth borers by the hot-water treatment, Doctor Brandes, in the course of his pathological investigations (July and August, 1920), had made a series of tests with sugar cane to determine the resistance of the eyes to the hot-water treatment at different temperatures and for various durations of time, and the possible stimulating action of such treatment. He found that the eyes were not killed in the pieces of stalks bearing single eyes used in his tests, with the temperature up to 50° C. and for a duration up to 30 minutes (in some tests for a longer time and in exceptional cases at higher temperatures); but that, on the other hand, the treatment had an apparently stimulating effect upon the rapidity with which the young shoots grew out from eyes of the treated stalks. The results of these experiments also have not been published, but the data were likewise reported to Mr. Holloway at Audubon Park, in a letter dated August 17, 1922.[2] In the fall of 1922 field trials by W. G. Taggart, of the Louisiana Sugar-Experiment Station, Audubon Park, New Orleans, confirmed these findings with reference to the stimulating effect upon the growth of the young shoots from the dormant eyes and thus also upon the percentage of germination of the eyes.

In the spring of 1923 the senior writer of these notes planned, upon the strength of the above-mentioned published and unpublished results, to apply the hot-water treatment to a series of plats in other experiments on the sugar-cane experiment farm at Cairo, Ga. Noting that the cane available for planting had sprouted extensively in the banks, it occurred to him that eyes in the sprouted condition might not possess the same resistance to the hot-water treatment as did the dormant eyes in the cane used by Doctor Brandes in 1920 or by Mr. Taggart in the fall of 1922. He therefore suggested to the junior writer of these notes, then temporarily stationed at Cairo, Ga., that he make tests on a small scale prior to the time when it was intended to plant the field plats. This was done and the following data obtained.

The cane was of the slender-stalk fibrous type, Cayana–10, in each case here reported. Cuttings with two to four eyes were used. From one-tenth to one-fourth of the eyes had sprouted and the shoots grown to a length of half an inch or more. They were treated 30 minutes in each case in a copper tank 3 feet long, 9 inches wide, and 8 inches deep half filled with water, which was heated with a kerosene burner.

In the first lot the initial temperature of the water was 52° C. The addition of the cane cuttings caused the temperature to drop immediately to 49.5° C. In 7 minutes it had reached 50°, and during the remainder of the 30 minutes it was held between 50° and 51° C.

In the second lot the initial temperature of the water was 52.5° C. It dropped to 50° upon the addition of the cane cuttings and was held between 50° and 51° during the 30 minutes, except during two or three minutes when it reached 51.5° C.

The third lot was put into water at 58° C., the temperature dropping immediately to 55.3°. For 30 minutes the temperature re-

[2] It is with the consent of Doctor Brandes that these data and results selected from his experiments on the effect of the hot-water treatment upon the moth borers and upon the cane eyes are included in this report.

mained between 55° and 58°, being at 57° C. during the greater portion of the period.

These three lots were treated on March 14 and, with an untreated check lot, were immediately taken to the field and planted in sandy loam of favorable tilth and moisture content. The cuttings from the treated lots were dug up on March 21 and examined; then replanted. These and also cuttings from the check lot were finally dug up and examined on March 27. On March 23 two additional check lots of cuttings from which all but the sprouted eyes had been cut out were planted, and these were likewise examined on March 27. The results obtained are shown in Table 1. Practically all the sprouted eyes in each of the treated lots were included among those recorded as "dead."

TABLE 1.—*Germination of sugar-cane eyes after treatment in hot water for 30 minutes at various temperatures.*

Items of comparison.	Eye counts on March 21.		Eye counts on March 27.	
	Good eyes.	Dead eyes.	Good eyes.	Dead eyes.
First lot: 30 eyes, of which 4 were sprouted. Treated and planted March 14	25	5	24	6
Second lot: 30 eyes, of which 3 were sprouted. Treated and planted March 14	27	3	19	11
Third lot: 30 eyes, of which 8 were sprouted. Treated and planted March 14	20	10	5	25
Check lot No. 1: Not treated. (Number of sprouted eyes not recorded.) Planted March 14			28	2
Check lot No. 2: Sprouted eyes only. Planted March 23			30	0
Check lot No. 3: Sprouted eyes only. Planted March 23			29	0

From these preliminary trials it became apparent that with seed cane from which many eyes had sprouted and grown to a length of half an inch or more there would be serious loss in the sprouted eyes if the cane were subjected to the hot-water treatment. When, about a week later, the ground was ready to plant in other experiments, the cane had sprouted more extensively than was the case with the cuttings used in the preliminary tests. It was therefore decided to omit the hot-water treatment in the regular series of plats, and only small plats from 0.04 to 0.06 acre each were planted with seed cane subjected to the hot-water treatment. In this case from 50 to 100 pounds of cane were treated at a time in a tank of a size sufficient to hold about four times the volume of water necessary to cover the cane. The water was heated by the use of steam pipes in the bottom of the tank, and accompanied with liberal agitation the temperature was held during each treatment within one-half degree of 50° C. Treatment in each case was for 30 minutes. In one instance the germination of the treated cane was only about one-fifth as high as that of the untreated cane in a check plat. In another test there was practically no difference in the percentage of germination. In both of these cases the germination was very low, owing to the diseased condition of the cane as it came from winter storage in the banks. From other lots of cane in the same field a pathological examination of the seed cane revealed the presence among other

organisms of red-rot (*Colletotrichum falcatum*) and the rind disease (*Melanconium sacchari*). It seems apparent that without further investigations it must be considered unsafe to subject to the hot-water treatment (30 minutes at 50° C.) cane that has sprouted extensively during winter storage, or if such cane is subjected to the hot-water treatment it may be necessary to plant much thicker in order to secure a normal stand.

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